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OFFICE OF
CHEMICAL SAFETY AND
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MEMORANDUM **June 15, 2010**

SUBJECT: Update to Drinking Water Exposure Assessments for Current Uses of Oxamyl.

TO: Monica Wait, Chemical Review Manager
Tracy Perry, Team Leader
Risk Management and Implementation Branch III
Pesticide Re-evaluation Division (7508P)

Mohsen Sahafeyan, Risk Assessor
Felecia Fort, Chief
Risk Assessment Branch VI
Health Effects Division (7509P)

FROM: Greg Orrick, Environmental Scientist Greg Orrick 6-15-10
Environmental Risk Branch IV
Environmental Fate and Effects Division (7507P)

THROUGH: Marietta Echeverria, Risk Assessment Process Leader M. Echeverria 6-15-10
Mark Corbin, Acting Chief
Environmental Risk Branch IV
Environmental Fate and Effects Division (7507P) Mark Corbin 6-15-10

This memorandum updates the analyses of current uses of oxamyl [(*EZ*)-N,N-dimethyl-2-methylcarbamoyloxyimino-2-(methylthio)acetamide; CAS# 23135-22-0; PC Code 103801] that were conducted in three refined drinking water exposure assessments, two of which were conducted in 2009 (DP barcode 351367; USEPA, 2009) and the third in 2010 (DP barcode 372628, USEPA, 2010). In response to comments submitted by DuPont and/or to correct errors, Tier II surface water exposure estimates were updated for two current uses assessed in 2009 (carrots and cotton) based on maximum use patterns, one current use characterized in 2009 at a reduced use rate (*i.e.*, typical rate) based on reported usage (carrots), and two current tropical uses characterized in 2010 (ginger root and yams) using a provisional Tier II modeling approach and maximum use patterns. Lastly, for additional characterization, exposure was estimated from

lower-than-maximum application rates based on reported usage data for six of the ten current uses assessed in 2010. The remaining four current uses assessed in 2010 were not expected to result in risk exceedances at maximum use rates, based on a back-calculated approximate cut-off point of 80 µg/L provided by the Health Effects Division (HED) (email communication with Mohsen Sahafeyan, May 26, 2010). Reported use patterns were based on usage data collected by the Biological and Economic Analysis Division (BEAD) from a variety of sources (USEPA, 2010). Ground water exposure estimates and characterization of monitoring data that were reported in the 2009 assessment were not impacted by comments submitted by DuPont and were not updated in this memorandum.

Surface water exposure estimates from the currently labeled maximum use patterns using current models and adjusted with national and regional percent cropped area (PCA) values are listed below in **Table 1**. Updated values are included. Tier I modeling was conducted for use on ginger root, pineapple, and yams because Tier II model scenarios (including surrogates) were not available with which to analyze these tropical uses that occur in Hawai'i and/or Puerto Rico. However, provisional Tier II modeling (described in the 2010 assessment) was also conducted for these uses in order to characterize the exposure; results from this characterization are tabulated in parentheses. Tier II modeling was conducted to estimate exposure for the remaining current uses. Model inputs are listed in **Tables 3-5**.

Table 1. Estimated Drinking Water Concentrations (EDWC) from Maximum Use Patterns of Oxamyl (values >80 µg/L are bolded; provisional values are in parentheses).

Drinking Water Source (model/data source)	Use (modeled rate)	PCA [A]	1-in-10-Year Peak (µg/L)	1-in-10-Year Annual Mean (µg/L)	30-Year Mean (µg/L)
Surface water (FIRST)	Ginger root (8.0 lbs a.i./A/year)	100%	**279 (269)**	6.6 (13)	--
	Pineapple (8.0 lbs a.i./A/year)	100%	**593 (351)**	14 (13)	--
	Yams (4.0 lbs a.i./A/year)	100%	**218 (108)**	5.1 (5.0)	--
Surface water (PE)	Apples (2.0 lbs a.i./A/year)	87%	27	0.58	0.27
	Banana/plantain (4.0 lbs a.i./A/year)	100%	**204**	6.3	2.3
	Carrots (7.0 lbs a.i./A/year)	85%	**161**	5.4	3.3
	Celery (6.0 lbs a.i./A/year)	82%	**138**	5.2	2.7
	Citrus (6.0 lbs a.i./A/year)	38%	70	1.6	1.0
	Cotton (3.0 lbs a.i./A/year)	80%	**96**	2.4	1.1
	Cucumbers (6.0 lbs a.i./A/year)	67%	**147**	3.3	1.8
	Dry bulb onions (4.0 lbs a.i./A/year)	67%	**90**	1.9	0.52
	Eggplant (6.0 lbs a.i./A/year)	85%	**237**	9.1	3.6
	Mint (4.0 lbs a.i./A/year)	87%	12	0.40	0.24
	Non-bearing fruit (8.0 lbs a.i./A/year)	38%	**124**	3.1	1.5
	Peanut (4.0 lbs a.i./A/year)	87%	55	2.3	1.6
	Pear (2.0 lbs a.i./A/year)	87%	41	1.3	0.41
	Peppers (6.0 lbs a.i./A/year)	85%	**256**	4.7	2.2
	Potatoes (8.0 lbs a.i./A/year)	85%	**243**	6.4	3.1
	Sweet potato (6.0 lbs a.i./A/year)	87%	59	1.9	0.82
	Tobacco (2.0 lbs a.i./A/year)	87%	7.2	0.25	0.18
	Tomatoes (8.0 lbs a.i./A/year)	85%	**208**	4.5	2.4

A PCA means "percent cropped area." A PCA of 100% was applied to uses in areas outside the contiguous United States. The default national PCA of 87% was applied to uses within the contiguous United States with EDWCs <80 µg/L. Default regional PCAs were applied to the remaining uses.

B The modeled total annual application rate to ginger root was 8.0 lbs a.i./A at Tier I and 4.0 lbs a.i./A for Tier II characterization.

Model input values are largely the same in the current update and previous drinking water exposure assessments, with two exceptions for uses assessed in 2010 and for the uses assessed in 2009 that are currently being updated: 1) the aerobic aquatic metabolism half-life input was set to zero because degradation was not observed beyond that expected due to hydrolysis alone in the submitted aerobic aquatic metabolism study, and 2) a calculated Henry's Law Constant was input rather than a vapor pressure. All of the uses assessed in 2009 were not updated to reflect these model input changes because the newer model input values do not result in substantially different acute exposure estimates.

Surface water exposure estimates for use patterns based on reported usage are provided for characterization in **Table 2**. Reported use patterns were not characterized for uses in **Table 1** for which 1-in-10-year peak values were less than 80 µg/L. Exposure estimates for bananas/plantains are not reduced in **Table 2** because typical usage of oxamyl on the crop is at maximum rates. The 30-year daily time series of EDWCs that Tier II point estimates in **Tables 1 and 2** represent will be transmitted (as comma delimited files) with this assessment to the Health Effects Division (HED) for modeling in support of human health dietary risk assessment.

It is important to note that only one use pattern per crop was modeled to produce the results in **Table 2** due to the complexity of label directions. If the specific label directions used for modeling are changed to eliminate potential risk exceedances, other use patterns not modeled in this assessment may still result in risk exceedances. For example, both use patterns for eggplant modeled in the 2010 DWA, one for nematodes and the other for insects, resulted in EDWCs >80 µg/L. If the use pattern assessed in this update is mitigated to reduce exposure, exposure from the use pattern not assessed in this update will not necessarily be reduced as well.

Table 2. EDWCs from Reported Use Patterns of Oxamyl Based on Reported Usage (values >80 µg/L are bolded; provisional values are in parentheses).

Drinking Water Source (model/data source)	Use (modeled rate)	PCA [A]	1-in-10-Year Peak (µg/L)	1-in-10-Year Annual Mean (µg/L)	30-Year Mean (µg/L)
Surface water (FIRST)	Ginger root (4.0 lbs a.i./A/year)	100%	**198 (266)**	4.7 (6.7)	–
	Pineapple (3.0 lbs a.i./A/year)	100%	**120 (149)**	2.8 (5.2)	–
	Yams (2.5 lbs a.i./A/year)	100%	**171 (108)**	4.0 (3.9)	–
Surface water (PE)	Banana/plantain (4.0 lbs a.i./A/year)	100%	**204**	6.3	2.3
	Carrots (2.0 lbs a.i./A/year)	85%	75	2.8	0.97
	Celery (3.0 lbs a.i./A/year)	82%	69	2.6	1.3
	Cotton (1.0 lbs a.i./A/year)	80%	56	0.96	0.34
	Cucumbers (2.0 lbs a.i./A/year)	67%	45	0.91	0.46
	Dry bulb onions (3.5 lbs a.i./A/year)	67%	32	1.2	0.67
	Eggplant (1.9 lbs a.i./A/year)	85%	72	2.5	1.1
	Non-bearing fruit (2.0 lbs a.i./A/year)	38%	45	0.85	0.37
	Peppers (2.0 lbs a.i./A/year)	85%	**87**	1.5	0.73
	Potatoes (3.0 lbs a.i./A/year)	85%	**88**	2.9	1.1
	Tomatoes (4.5 lbs a.i./A/year)	85%	**159**	2.6	1.1

A PCA means "percent cropped area." A PCA adjustment was not applied to uses in areas outside the contiguous United States. Default regional PCA values were applied to the remaining uses.

1. Exposure Modeling Input Parameters

1.1. Tier I Modeling

FIRST was used in the 2010 DWA to estimate screening level exposure in surface water from use of oxamyl on yams (labeled for Puerto Rico only), ginger root (labeled for Hawai'i only), and pineapple (label prohibits use in California; grown in Hawai'i and Puerto Rico). Other assessed uses were modeled with the Tier II PE model because PRZM scenarios or reasonable surrogate PRZM scenarios were available. Model input parameters used in FIRST are listed in **Table 3**. No model input parameters were changed for this DWA update.

Table 3. FIRST Input Parameters for Oxamyl Uses on Yams, Ginger Root, and Pineapple.

Input Parameter	Value	Comments	Source
Application rate (lbs a.i./A)	Ginger root: 1.0 Pineapple: 2.0 Yams: 0.5	Maximum labeled single application rate for post-plant or foliar treatment	Current label
Number of applications per year	Ginger root: 8 Pineapple: 4 Yams: 8	Maximum labeled number of applications per season (either explicit or inferred from the maximum seasonal application rate)	Current label
Re-application interval (days)	Ginger root: 30 Pineapple: 14 Yams: 14	Minimum labeled re-application intervals	Current label
Percent cropped area	100%	Default for uses outside of the contiguous United States	Effland *et al.*, 1999
Organic Carbon Partition Coefficient (K_{OC}) (L/kg_{OC})	35	Mean of five K_{OC} values	MRID 46237301
Aerobic soil metabolism half-life (days)	52	Upper 90% confidence bound on the mean of six half-lives	MRID 63012 MRID 42820001 MRID 45176602
Wetted in?	No	Input recommended in divisional guidance	USEPA, 2009c
Method of application	Ground	Modeled use patterns are for foliar ground applications.	Current label
Depth of incorporation (inches)	0	Foliar applications are not incorporated.	Current label
Solubility in water (ppm)	280,000	Product chemistry data	MRID 40499702
Aerobic aquatic metabolism half-life (days)	0	At the study pH levels, aqueous degradation was indistinguishable from that due to hydrolysis.	MRID 45045305
Hydrolysis half-life (days)	8.0	Half-life at pH 7	MRID 40606516
Aqueous photolysis half-life (days)	14	Maximum environmental phototransformation half-life	MRID 40606515; 41058801

1.2. Tier II Modeling

Chemical Inputs

The chemical input parameters for PE are listed in **Table 4**. Input values are largely the same in the current update and previous drinking water exposure assessments, with two exceptions for uses assessed in 2010 and for the uses assessed in 2009 that are currently being updated: 1) the aerobic aquatic metabolism half-life input was set to zero because degradation was not observed beyond that expected due to hydrolysis alone in the submitted aerobic aquatic

metabolism study, and 2) a calculated Henry's Law Constant was input rather than a vapor pressure. The use of the Henry's Law Constant is consistent with guidance and does not alter exposure estimates. The new aerobic aquatic metabolism input results in a small increase in 1-in-10-year peak EDWCs and larger increases in time-averaged EDWCs because stability to aquatic metabolism results in less degradation over time in the index reservoir. For example, the 1-in-10-year peak (256 µg/L), 1-in-10-year annual mean (4.7 µg/L), and 30-year mean (2.2 µg/L) EDWCs for the maximum use pattern for peppers are increased with the new aerobic aquatic metabolism input to 262 µg/L, 9.0 µg/L, and 4.1 µg/L, respectively. In summary, the 1-in-10-year peak estimates are not substantially different, while the time-averaged estimates are approximately doubled. All of the uses assessed in 2009 were not updated to reflect these model input changes because of the insubstantial difference in acute exposure estimates.

Table 4. PE Chemical Input Parameters for Oxamyl.

Input Parameter	Value	Comment	Source
Molecular Mass (g/mol)	219	Product chemistry data	MRID 40499702
Henry's Law Constant [A] (atm m^3/mol)	3.9×10^{-13}	Product chemistry data	Calculated from MRID 42526101, 40499702
Solubility in Water (mg/L)	2.8×10^{5}	Product chemistry data	MRID 40499702
Organic Carbon Partition Coefficient (K_{OC}) (L/kg_{OC})	35	Mean of five K_{OC} values	MRID 46237301
Aerobic Soil Metabolism Half-life (days)	52	Upper 90% confidence bound on the mean of six half-lives	MRID 63012 MRID 42820001 MRID 45176602
Aerobic Aquatic Metabolism Half-life (days) [B]	0	Aqueous degradation is indistinguishable from that due to hydrolysis.	MRID 45045305
Anaerobic Aquatic Metabolism Half-life (days)	0	Assumed stable in the absence of data. Aqueous degradation will be dominated by hydrolysis.	Not applicable
Hydrolysis Half-life (days)	8.0	Half-life at pH 7	MRID 40606516
Aqueous Photolysis Half-life (days)	14	Maximum environmental phototransformation half-life	MRID 40606515; 41058801

A The Henry's Law Constant value of 3.9×10^{-13} atm m^3/mol was used to model uses assessed or updated in 2010. The remaining uses assessed in 2009 were modeled with a vapor pressure input (3.8×10^{-7} torr) instead.

B The aerobic aquatic metabolism half-life model input was updated to zero for uses assessed or updated in 2010. For the remaining uses that were assessed in 2009, the aerobic aquatic metabolism half-life was 6.6 days.

Use Pattern Inputs

The model input parameters used in PRZM to simulate oxamyl application and crop management practices are provided in **Table 5**. Explanations of the selected model input values and scenarios are provided in the previous assessments. Updates to the model input parameters in this assessment relative to previous assessments include: 1) the removal of the South Texas vegetable scenario for modeling use on carrots (due to the poor drainage of the heavy clay soil of the scenario), 2) an initial application date of August 9th rather than September 7th for modeling use on cotton with the Mississippi cotton scenario (in order to be consistent with the modeled crop timing), and 3) an initial application date of October 25th rather than April 1st for modeling use on eggplant with the Florida pepper scenario (also to be consistent with the modeled crop timing). Furthermore, whereas the 2010 DWA assessed two different use patterns for single PRZM scenarios for uses on celery and eggplant, this update restricts all use and PRZM scenario

combinations to one use pattern each, whichever use pattern results in the highest exposure estimates. This means that 1) the aerial use pattern for the Florida cabbage scenario used to assess use on celery and 2) the nematode-control use pattern with two initial applications of 2.0 lbs a.i./A followed by two applications of 1.0 lb a.i./A used to assess use on eggplant in the 2010 DWA have been removed.

Table 5. PRZM Scenarios and Input Parameters Describing Maximum Oxamyl Use Patterns.

Uses	Scenario	Date of Initial App.	App. Rate (lbs a.i./A)	App. per Year	App. Interval (days)	CAM Input	IPSCND Input	Application Efficiency/ Spray Drift
Apple (bearing fruit)	PA apple STD	Apr. 1	2.0	1	N/A	2	3	0.99/0.064
	NC apple STD							
	OR apple STD							
	CA fruit STD							
Banana/plantain	PR coffee STD	Sep. 1	4.0	1	N/A	1	3	0.99/0.064
Carrot	CA row crop RLF	Jan. 11	1.0, 4.0 [A]	4	14, 309 [A]	2	1	0.99/0.064
	PA vegetable NMC	May 7	4.0, 1.0 [B]		14			
	FL carrot STD	Oct. 13						
Celery	CA row crop RLF	Jan. 15	1.0	6	5	2	1	0.95/0.16
	FL cabbage STD		2.0	3	21			0.99/0.064
Citrus (bearing fruit)	CA citrus STD	Oct. 1	2.0	3	30	2	3	0.99/0.064
	STX grapefruit NMC	Apr. 1	1.0	6	15	2	3	0.95/0.16
	FL citrus STD							
Cotton	CA cotton STD	Sep. 20	1.0	3	6	2	1	0.95/0.16
	NC cotton STD	Aug. 1	0.50	6				
	TX cotton OP	Sep. 15						
	STX cotton NMC	Jul. 20						
	MS cotton STD	Aug. 9						
Cucumber	CA melons RLF	May 16	1.0	6	7	2	1	0.95/0.16
	STX melon NMC	Feb. 1						
	MO melon STD	Apr. 10						
	MI melon STD	Apr. 30						
	FL cucumber STD	Oct. 16						
	NJ melon STD	May 1						
Dry onion	CA onion STD	Jan. 16	2.0, 0.5 [C]	3	14	2	1	0.99/0.064
	WA onion NMC	Jun. 15			5 [D]			
	PA vegetable NMC	May 24	2.0	2	14			
	GA onion STD	Oct. 1						
Eggplant	CA row crop RLF	Jan. 15	1.0	6	7	2	1	0.99/0.064
	CA tomato STD	Jul. 15						
	FL tomato STD	Apr. 1						

Table 5. PRZM Scenarios and Input Parameters Describing Maximum Oxamyl Use Patterns.								
Uses	**Scenario**	**Date of Initial App.**	**App. Rate (lbs a.i./A)**	**App. per Year**	**App. Interval (days)**	**CAM Input**	**IPSCND Input**	**Application Efficiency/ Spray Drift**
	FL pepper STD	Oct. 25						
	PA tomato STD	Jul. 15						
	PA vegetable NMC	Aug. 1						
	STX vegetable NMC	Jan. 15						
Mint	OR mint STD	Apr. 15	2.0	2	21	2	1	0.99/0.064
Non-bearing fruit	CA fruit STD	Mar. 1	1.0	8	7	2	3	0.95/0.16
	CA citrus STD							
	FL citrus STD							
	GA peach STD							
	MI cherry STD	May 1						
	NC apple STD	Apr. 1						
	OR apple STD							
	Orchard BSS							
	WA orchard NMC							
	PA apple STD	Apr. 16						
	STX grapefruit NMC	Mar. 16						
Peanut	NC peanut STD	May 30	0.5	8	14, 5 [E]	2	1	0.95/0.16
Pear (bearing fruit)	PA apple STD	Mar. 1	2.0	1	N/A	2	3	0.99/0.063
	NC apple STD							
	OR apple STD							
	WA orchard NMC							
	TX orchard BSS							
Pepper	CA row crop RLF	Jan. 1	1.0	6	7	2	1	0.95/0.16
	STX vegetable NMC	Oct. 1						
	PA vegetable NMC	May 10						
	FL pepper STD	Sep. 1						
Potato	CA potato RLF	Apr. 15	1.0	8	5	2	1	0.95/0.16
	IDN potato STD	Aug. 1						
	WA potato NMC	Jul. 15						
	FL potato NMC	Mar. 1						
	ME potato STD	Jun. 15		6				
Sweet potato	FL potato NMC	Dec. 13	2.0, 4.0 [F]	2	5 [F]	4 [F]	1	0.99/0.064
	NC sweet potato STD	Apr. 26						
Tobacco	NC tobacco STD	Apr. 15	2.0	1	N/A	4 [G]	2	0.99/0.064
Tomato	CA tomato STD	Apr. 1	1.0	8	5	2	1	0.95/0.16
	STX vegetable NMC	Nov. 15						

Table 5. PRZM Scenarios and Input Parameters Describing Maximum Oxamyl Use Patterns.								
Uses	**Scenario**	**Date of Initial App.**	**App. Rate (lbs a.i./A)**	**App. per Year**	**App. Interval (days)**	**CAM Input**	**IPSCND Input**	**Application Efficiency/ Spray Drift**
	FL tomato STD	Mar. 24						
	PA tomato STD	Aug. 15						

A Because the initial application occurs in December, this use pattern was modeled with 3 applications at 1.0 lb a.i./A, 14 days apart, beginning January 11th and followed 309 days later, in December, by the next season's initial application of 4.0 lbs a.i./A.

B The initial application is 4.0 lbs a.i./A, followed by 3 applications at 1.0 lb a.i./A.

C The initial two applications are 2.0 lbs a.i./A, followed by one application at 0.5 lbs a.i./A.

D Interval is assumed in the absence of a labeled value.

E Interval of 14 days is labeled for the second application. Interval of 5 days is assumed for following applications in the absence of a labeled value.

F The initial application is 2.0 lbs a.i./A incorporated to a 10-cm-depth, followed by an application at 4.0 lbs a.i./A applied in-furrow at transplant (CAM value set to 4 for all applications). Interval of 5 days is assumed in the absence of a labeled value.

G Application is incorporated to a 10-cm depth.

PE exposure estimates for uses within the contiguous United States were multiplied by the default national percent cropped area factor (PCA), which is 87% (Effland *et al.*, 1999). PE exposure estimates for uses constrained to Hawai'i and/or Puerto Rico were not adjusted by a PCA value because PCA values are not available for these areas.

Regional PCA Refinement

A previous dietary risk assessment determined that dietary levels of concern (for food plus water and accounting for number of eating occasions per day) were not exceeded when EDWC time series were represented by a 1-in-10-year peak value below approximately 80 µg/L (personal communication with Sheila Piper, Nov. 19, 2008). This back-calculated point estimate used to evaluate probabilistic distributions was revisited recently due to a reevaluation of toxicity data upon which the FQPA factor is based. Although the reevaluation resulted in a reduction of the FQPA factor, this cut-off point could not be raised to a higher value with certainty because of variability in the drinking water distributions for different crops (email communication with Mohsen Sahafeyan, May 26, 2010). Therefore, the cut-off point of 80 µg/L was retained as an approximate level of concern.

As with past drinking water exposure assessments, this assessment update applies regional PCA refinements for uses within the contiguous United States for which initial acute exposure estimates (adjusted by the national default PCA) exceed 80 µg/L. These uses were refined by applying default regional PCA values that account for the highest extent of HUC-8 watershed in the HUC-2 regions on which agricultural crops are grown (Effland *et al.*, 1999). **Figure 1** displays the 18 regions (or HUC-2 watershed basins) of the contiguous United States for which regional PCA factors were calculated. This refinement could not be conducted with exposure estimates for uses constrained to Hawai'i and/or Puerto Rico because PCA values, including regional PCA values, are not available for these areas. Further explanation of this refinement process is contained in the previous drinking water exposure assessments.

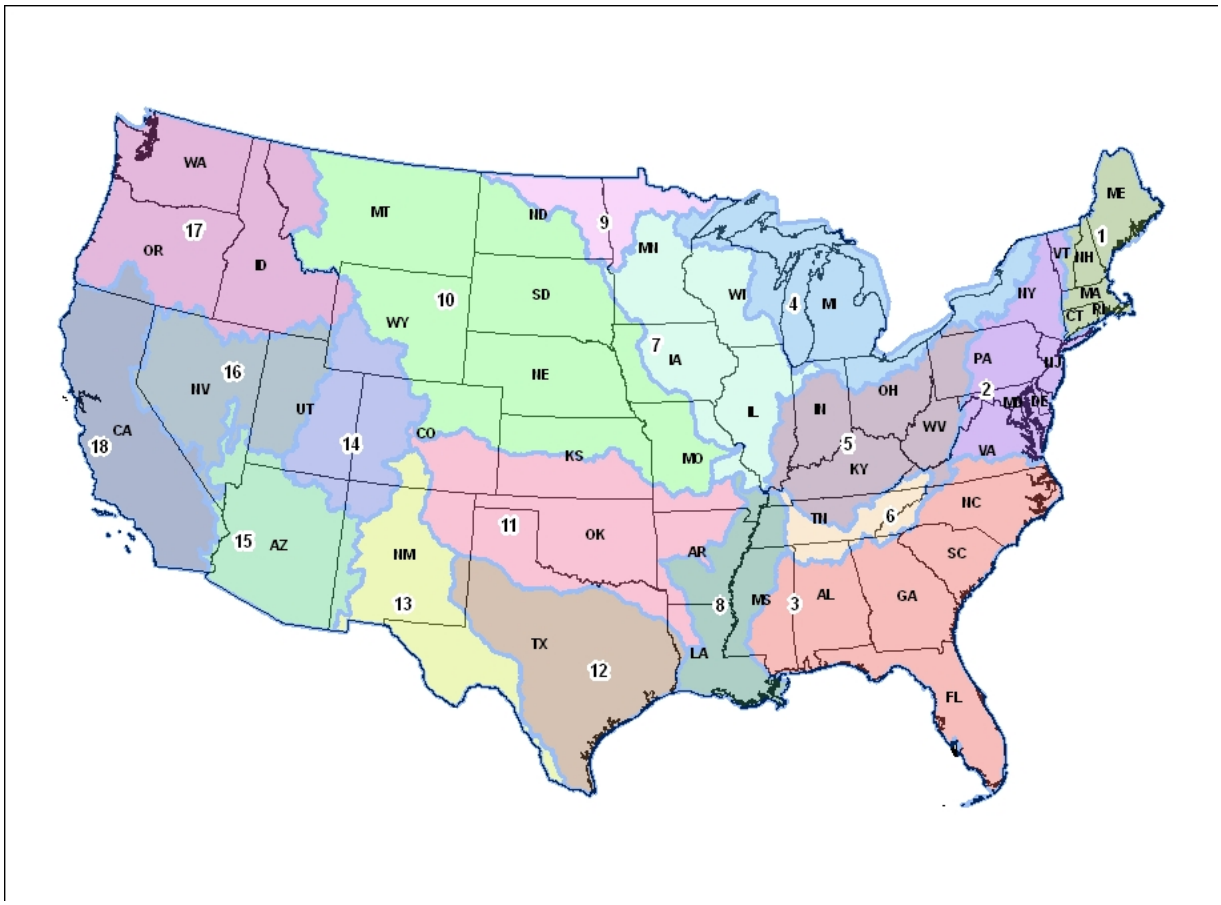

Figure 1. The Eighteen HUC-2 Watershed Basins of the Contiguous United States.

Table 6 lists the PRZM scenarios assigned to each use-PCA region combination where oxamyl might be applied. The only update in **Table 6** relative to the previous assessments is that, for carrots, the Florida carrot scenario replaced the South Texas vegetable scenario assignment for PCA regions 8, 11, 12, and 13.

Table 6. Scenario assigned to each combination of use and major basin (HUC-2 region).													
Major Basin #	**Basin Name**	**Regional PCA**	**Carrot**	**Celery**	**Citrus**	**Cotton**	**Cucumber**	**Dry bulb onion**	**Eggplant**	**Non-bearing fruit**	**Pepper**	**Potato**	**Tomato**
East of Eastern Divide													
1	New England	14	PA vegetable NMC	–	–	–	NJ melon STD	–	PA tomato STD	PA apple STD	PA vegetable NMC	ME potato STD	PA tomato STD
2	Mid Atlantic	46	PA vegetable NMC	FL cabbage STD	–	NC cotton STD	NJ melon STD	–	PA tomato STD	PA apple STD	PA vegetable NMC	ME potato STD	PA tomato STD
3	South Atlantic	38	FL carrot STD	FL cabbage STD	FL citrus STD	MS cotton STD	FL cucumber STD	–	FL pepper STD	FL citrus STD	FL pepper STD	FL potato NMC	FL tomato STD
Mid-Continent (Mississippi River Basin)													
4	Great Lakes	77	PA vegetable NMC	FL cabbage STD	–	–	MI melon STD	PA vegetable NMC	PA tomato STD	MI cherry STD	PA vegetable NMC	ME potato STD	PA tomato STD
5	Ohio	82	PA vegetable NMC	FL cabbage STD	–	–	MO melon STD	–	PA tomato STD	PA apple STD	PA vegetable NMC	ME potato STD	PA tomato STD
6	Tennessee	38	PA vegetable NMC	–	–	MS cotton STD	MO melon STD	–	FL pepper STD	NC apple STD	PA vegetable NMC	–	PA tomato STD
7	Upper Mississippi	85	PA vegetable NMC	–	–	–	MI melon STD	–	PA tomato STD	MI cherry STD	PA vegetable NMC	ME potato STD	PA tomato STD
8	Lower Mississippi	85	FL carrot STD	–	STX grape-fruit NMC	MS cotton STD	MO melon STD	–	STX vegetable NMC	GA peach STD	STX vegetable NMC	FL potato NMC	STX vegetable NMC
9	Souris	83	PA vegetable NMC	–	–	–	–	–	PA tomato STD	–	PA vegetable NMC	ME potato STD	–
10	Missouri	87	PA vegetable NMC	–	–	–	MO melon STD	–	PA tomato STD	MI cherry STD	PA vegetable NMC	ME potato STD	–
11	Arkansas	80	FL carrot STD	FL cabbage STD	–	TX cotton OP	MO melon STD	WA onion NMC	STX vegetable NMC	Orchard BSS	STX vegetable NMC	FL potato NMC	–
12	Texas Gulf	67	FL carrot STD	FL cabbage STD	STX grape-fruit NMC	STX cotton NMC	STX melon NMC	GA onion STD	STX vegetable NMC	Orchard BSS	STX vegetable NMC	FL potato NMC	STX vegetable NMC
13	Rio Grande	28	FL carrot STD	FL cabbage STD	–	TX cotton OP	–	CA onion STD	STX vegetable NMC	CA citrus STD	STX vegetable NMC	WA potato NMC	–
West of Western Divide													
14	Upper Colorado	7	CA row crop RLF	CA row crop RLF	–	–	–	–	CA tomato STD	OR apple STD	CA row crop RLF	WA potato NMC	CA tomato STD
15	Lower Colorado	11	CA row crop RLF	CA row crop RLF	CA citrus STD	CA cotton STD	–	CA onion STD	CA tomato STD	CA citrus STD	CA row crop RLF	CA potato RLF	–
16	Great Basin	28	CA row crop RLF	CA row crop RLF	–	–	–	–	CA tomato STD	OR apple STD	CA row crop RLF	WA potato NMC	–
17	Pacific Northwest	63	CA row crop RLF	–	–	–	CA melon RLF	WA onion NMC	CA tomato STD	OR apple STD	CA row crop RLF	WA potato NMC	CA tomato STD
18	California	56	–	CA row crop RLF	CA citrus STD	CA cotton STD	CA melon RLF	CA onion STD	CA tomato STD	CA fruit STD	CA row crop RLF	CA potato RLF	CA tomato STD

2. Exposure Modeling Results

2.1. Tier I Results

Tier I modeling results of the 2010 DWA did not change in this assessment update because model input parameters were not updated. Screening acute and chronic exposure estimates in surface water drinking water sources from FIRST are listed in **Table 7**. Use on pineapple resulted in the highest estimated peak exposure (593 µg/L).

Table 7. Tier I Estimated Drinking Water Concentrations (EDWCs) from Use of Oxamyl on Ginger Root, Pineapple, or Yams (values >80 µg/L are bolded).

Use (modeled rate)	Peak (µg/L)	Annual Mean (µg/L)
Ginger root (8.0 lbs a.i./A/year)	**279**	6.6
Pineapple (8.0 lbs a.i./A/year)	**593**	14
Yams (4.0 lbs a.i./A/year)	**218**	5.1

Exposure Characterization with Provisional PE Scenarios

Because Tier I modeling of the uses on ginger root, pineapple, and yams produced peak exposure estimates >80 µg/L, a provisional Tier II modeling approach was used to characterize potential refinement of these estimates. Unrelated scenario and metfile data were paired for modeling because surrogate PRZM scenarios were not available for these uses in Hawai'i or Puerto Rico but meteorological data (*i.e.*, "metfiles") were available for locations near where the modeled crops are grown. Modeling local metfiles was expected to increase the representativeness of modeled surrogate scenarios because the PE model is sensitive to precipitation. Therefore, the metfile for Hilo, Hawai'i (w21504) was used to model use on ginger root grown in Hawai'i, since it is near where most ginger root is grown on the Hawaiian Islands (USDA, 2010e). The metfile for San Juan, Puerto Rico was used for yams grown in Puerto Rico because it is the only metfile available for the Territory. And lastly, because pineapple is grown in both Puerto Rico and Hawai'i (but mostly on Oahu and Maui), metfiles for San Juan, Puerto Rico; Honolulu, Hawai'i; and Kahului, Hawai'i were used to model use on pineapple. This provisional approach was not changed in this assessment update.

Surrogate PRZM scenarios were selected for this provisional modeling refinement based on crop similarity and without regard to location because local surrogate scenarios were not available. More specifically, the Florida potato scenario was used to model use on ginger root and yams and the Florida cabbage scenario was used to model use on pineapples. These surrogate scenarios were selected for modeling rather than other potato or row crop scenarios because their vulnerability to runoff is higher than that of other scenarios (with the exception of that of the South Texas vegetable scenario).

Table 8 lists the PRZM scenarios, metfiles, and input parameters that were used for this provisional refinement. Two use patterns were modeled for use on ginger root in order to evaluate exposure from different application methods and timing. The first use pattern is a per-plant application of 4.0 lbs a.i./A that is incorporated to a depth of 5 cm. The second use pattern

is eight foliar (post-emergent) applications of 1.0 lb a.i./A, 30-days apart. Updates with respect to the previous assessment include changes in the initial application dates for yams and ginger root. The initial application date for yams was pushed forward from January 1st to February 15th in order to occur approximately two months after planting, as directed by the label, consistent with the PRZM scenario. The initial application date for post-emergent foliar applications to ginger root was changed from January 15th to April 4th in order to better approximate the application timing that may occur in the spring. The initial application date for pre-plant incorporated applications was not changed to the spring because it should not occur after the crop emergence date in the PRZM scenario, which is January 1st.

Table 8. PRZM Scenarios, Meteorological Files, and Input Parameters for Tier II Characterization of Tier I Modeled Use Patterns.

Use	Scenario	Metfile Location	Date of Initial App.	App. Rate (lbs a.i./A)	App. per Year	App. Interval (days)	CAM Input	IPSCND Input	Application Efficiency/ Spray Drift
Ginger root	FL potato NMC	Hilo, HI	Dec. 15	4.0	1	None	4[A]	1	0.99/0.064
			Apr. 4	1.0	8	30	2		
Pineapple	FL cabbage STD	Honolulu, HI	Oct. 16	2.0	4	14	2	1	0.99/0.064
		Kahului, HI							
		San Juan, PR							
Yams	FL potato NMC	San Juan, PR	Feb. 15	0.5	8	14	2	1	0.99/0.064

A Application is pre-plant at 4.0 lbs a.i./A, incorporated (CAM 4) to a 5-cm minimum depth.

Exposure estimates from this provisional refinement are listed for characterization in **Table 9**. The results indicate that the Tier I exposure estimates were conservative, but not unreasonable. With respect to Tier I values, this provisional refinement approach reduces peak EDWCs from 218 µg/L to 108 µg/L for use on yams, from 593 µg/L to 351 µg/L for use on pineapple, and from 279 µg/L to 269 µg/L for use on ginger root. Updates with respect to the previous assessment include a decrease in the peak EDWC for post-emergent foliar applications to ginger root from 392 µg/L to 269 µg/L and an increase in the peak EDWC for use on yams from 87 µg/L to 108 µg/L (both changes were caused by updated application dates for the uses).

Table 9. Tier II Characterization of EDWCs from Use of Oxamyl on Ginger Root, Pineapple, or Yams (values >80 µg/L are bolded). [A]

Use (modeled rate)	PCA [B]	PRZM Scenario/ Metfile	1-in-10 Year Peak (µg/L)	1-in-10-Year Annual Mean (µg/L)	30-Year Mean (µg/L)
Ginger root (4.0 lbs a.i./A/year) [C]	100%	FL potato NMC/ Hilo	**266**	6.7	2.2
(8.0 lbs a.i./A/year) [C]			**269**	13	6.6
Pineapple (8.0 lbs a.i./A/year)	100%	FL cabbage STD/ Honolulu	**351**	13	5.2
		FL cabbage STD/ Kahului	**167**	7.3	3.0
		FL cabbage STD/ San Juan	**177**	7.1	3.7
Yams (4.0 lbs a.i./A/year)	100%	FL potato NMC/ San Juan	**108**	5.0	2.8

A Each table row corresponds to the same row, in order, in **Table 8**.

B The PCA for uses outside of the contiguous United States is 100%.

C The first use pattern for ginger root is one incorporated application of 4.0 lbs a.i./A. The second use pattern is eight foliar applications of 1.0 lb a.i./A, 30-days apart.

Refined EDWCs for each use remained above 80 µg/L. If surface water drinking water intakes in Hawai'i and Puerto Rico are located in streams rather than reservoirs down-gradient from these uses, these EDWCs may underestimate the potential peak exposure and overestimate the potential time-averaged exposure resulting from these uses because less dilution will occur in the lower-volume streams that also provide less residence time than the modeled index reservoir. The relevance of the index reservoir to these situations is uncertain.

2.2. Tier II Results

Acute and chronic exposure estimates in surface water drinking water sources from PE are listed in **Table 10**. Only one PRZM scenario is listed per use. The listed scenario is the scenario from **Table 5** that resulted in the highest 1-in-10-year peak EDWC (accounting for PCA adjustments).

Exposure estimates for uses within the contiguous United States were adjusted by the default national PCA (87%) where exposure from that use was initially below 80 µg/L. Exposure estimates for the remainder of uses within the contiguous United States were adjusted by the default regional PCA associated with the maximum EDWC for the use listed in **Table 12** (this was not done for the uses on celery and eggplant in the 2010 DWA). Exposure estimates for uses in other areas were not adjusted by PCA values (*i.e.*, PCA=100%) because PCA values for areas outside of the contiguous United States are not available.

Based on the updated input values, reported estimates in **Table 10** for carrots and cotton have changed with respect to those of the previous assessments. The PRZM scenario and regional PCA listed for cotton have changed from Mississippi cotton and 85% to Texas cotton and 80% because the updated exposure estimates for the Mississippi scenario were below those of the Texas scenario. Also, unlike the previous DWA, multiple rows of EDWCs are not reported for uses on celery and eggplant. Oxamyl use on bananas/plantains, carrots, celery, cotton, cucumbers, dry bulb onions, eggplant, non-bearing fruit, peppers, potatoes, and tomatoes resulted in 1-in-10-year peak exposure estimates greater than 80 µg/L.

Table 10. Tier II Estimated Drinking Water Concentrations (EDWCs) Adjusted by Maximum PCAs Resulting from Application of Oxamyl.

Use (modeled rate)	PCA [A]	PRZM Scenario	1-in-10 Year Peak (µg/L)	1-in-10-Year Annual Mean (µg/L)	30-Year Mean (µg/L)
Apples (2.0 lbs a.i./A/year)	87%	PA apple	27	0.58	0.27
Banana/plantain (4.0 lbs a.i./A/year)	100%	PR coffee	**204**	6.3	2.3
Carrots (7.0 lbs a.i./A/year)	85%	FL carrot	**161**	5.4	3.3
Celery (6.0 lbs a.i./A/year)	82%	FL cabbage	**138**	5.2	2.7
Citrus (6.0 lbs a.i./A/year)	38%	FL citrus	70	1.6	1.0
Cotton (3.0 lbs a.i./A/year)	80%	TX cotton	**96**	2.4	1.1
Cucumbers (6.0 lbs a.i./A/year)	67%	STX melon	**147**	3.3	1.8
Dry bulb onions (4.0 lbs a.i./A/year)	67%	GA onion	**90**	1.9	0.52
Eggplant (6.0 lbs a.i./A/year)	85%	STX vegetable	**237**	9.1	3.6
Mint (4.0 lbs a.i./A/year)	87%	OR mint	12	0.40	0.24

Table 10. Tier II Estimated Drinking Water Concentrations (EDWCs) Adjusted by Maximum PCAs Resulting from Application of Oxamyl.					
Use (modeled rate)	**PCA [A]**	**PRZM Scenario**	**1-in-10 Year Peak (µg/L)**	**1-in-10-Year Annual Mean (µg/L)**	**30-Year Mean (µg/L)**
Non-bearing fruit (8.0 lbs a.i./A/year)	38%	FL citrus	**124**	3.1	1.5
Peanut (4.0 lbs a.i./A/year)	87%	NC peanut	55	2.3	1.6
Pear (2.0 lbs a.i./A/year)	87%	NC apple	41	1.3	0.41
Peppers (6.0 lbs a.i./A/year)	85%	STX vegetable	**256**	4.7	2.2
Potatoes (8.0 lbs a.i./A/year)	85%	FL potato	**243**	6.4	3.1
Sweet potato (6.0 lbs a.i./A/year)	87%	NC sweet potato	59	1.9	0.82
Tobacco (2.0 lbs a.i./A/year)	87%	NC tobacco	7.2	0.25	0.18
Tomatoes (8.0 lbs a.i./A/year)	85%	PA tomato	**208**	4.5	2.4

A Percent Cropped Area (PCA) values were used to adjust EDWCs. PCA values are the default national PCA (87%) for initial exposure estimates <80 µg/L for uses within the contiguous United States, the default regional PCA associated with the maximum EDWC for the use in **Table 12** for other uses within the contiguous United States, and 100% for areas outside of the contiguous United States.

Guidance indicates that the hydrolysis rate at pH 7 (half-life of 8.0 days for oxamyl) should be modeled, which was done for exposure estimation. However, oxamyl is relatively stable to hydrolysis in acidic water bodies. Therefore, exposure estimates in acidic water bodies are expected to be higher than those modeled in this assessment. As an example, use on plantains and bananas (crops that are mainly grown on soils of pH 4.5-5.5 in Puerto Rico; USDA, 2010) is considered. If exposure is estimated using hydrolysis rates at pH 5 or 6, exposure estimates increase as shown in **Table 11**. These estimates were not changed in this assessment update.

Table 11. Exposure Estimates for Oxamyl Use on Plantains and Bananas Using Hydrolysis Half-lives for Environments at pH 5, 6, or 7.				
Environmental pH	**Hydrolysis Half-life (days)**	**1-in-10 Year Peak (µg/L)**	**1-in-10-Year Annual Mean (µg/L)**	**30-Year Mean (µg/L)**
7	8.0	204	6.3	2.3
6	63	209	31	12
5	Stable	222	69	28

Regional PCA Refinement

Regional PCA-adjusted 1-in-10-year peak EDWCs were tabulated for each combination of use and HUC-2 watershed basin for uses within the contiguous United States for which initial EDWCs exceeded 80 µg/L (**Table 12**). This refinement indicated that exceedances of 80 µg/L do not occur in the New England PCA region (Major Basin 1) or any PCA region west of the Continental Divide. Updates to input parameters resulted in updated EDWCs in **Table 12** with respect to those in previous assessments, including values for carrots in PCA regions 8, 11, 12, and 13; for cotton in PCA region 8; and for eggplant in PCA regions 3 and 6.

Table 12. Regional PCA-refined 1-in-10-year Peak EDWCs for Oxamyl Uses Initially Exceeding 80 µg/L (values greater than 80 µg/L in bold).													
Major Basin #	**Basin Name**	**Regional PCA**	**Carrot**	**Celery**	**Citrus**	**Cotton**	**Cucumber**	**Dry bulb onion**	**Eggplant**	**Non-bearing fruit**	**Pepper**	**Potato**	**Tomato**
East of Eastern Divide													
1	New England	14	13	–	–	–	7	–	22	14	9.9	10	34
2	Mid Atlantic	46	44	77	–	72	23	–	73	47	33	33	**112**
3	South Atlantic	38	71	64	70	55	**105**	–	**124**	**124**	67	**109**	**177**
Mid-Continent (Mississippi River Basin)													
4	Great Lakes	77	74	**129**	–	–	29	52	**122**	38	54	55	**188**
5	Ohio	82	79	**138**	–	–	68	–	**130**	**84**	58	59	**200**
6	Tennessee	38	37	–	–	55	32	–	**124**	41	27	–	**93**
7	Upper Mississippi	85	**82**	–	–	–	32	–	**134**	42	60	61	**208**
8	Lower Mississippi	85	**161**	–	53	**94**	71	–	**237**	26	**256**	**243**	**120**
9	Souris	83	**80**	–	–	–	–	–	**131**	–	59	59	–
10	Missouri	87	**84**	–	–	–	73	–	**138**	43	61	62	–
11	Arkansas	80	**152**	**134**	–	**96**	67	15	**223**	**121**	**241**	**229**	–
12	Texas Gulf	67	**127**	**112**	41	**94**	**147**	**90**	**187**	**101**	**202**	**191**	**95**
13	Rio Grande	28	53	47	–	34	–	4.3	78	9.0	**84**	32	–
West of Western Divide													
14	Upper Colorado	7	7.2	5.5	–	–	–	–	4.5	2.6	3.9	7.9	3.2
15	Lower Colorado	11	11	8.6	3.4	5.1	–	1.7	7.1	3.5	6.1	2.7	–
16	Great Basin	28	29	22	–	–	–	–	18	10	15	32	–
17	Pacific Northwest	63	65	–	–	–	7.7	12	41	23	35	71	28
18	California	56	–	44	17	26	6.8	8.7	36	28	31	14	25

Exposure Characterization for Reported Rates

In order to characterize reductions in exposure estimates resulting from potential changes to the proposed and currently labeled use patterns, usage data were requested from the Biological and Economic Analysis Division (BEAD) for the uses in **Tables 9 and 12** for which EDWCs exceeded 80 µg/L. BEAD provided the requested usage data at the state-level (listed per crop stage for cotton) for the 2009 DWAs using data from 2003 to 2007 (DP barcode 359723; USEPA, 2009). Requested usage data at the state-level were also provided for the uses assessed in 2010 using data from 2004-2008 for celery and eggplant and direct communication with USDA personnel for the tropical uses bananas/plantains, ginger root, pineapple, and yams (DP barcode 377411; USEPA, 2010). Based on these data, "reported" or "actual" use patterns were identified (**Table 13**; analysis) for modeling with PRZM/EXAMS to estimate their resulting exposure and to explore whether the exposure would remain at levels expected to exceed 80 µg/L.

Updates to the 2009 assessments include 1) removal of the South Texas vegetable scenario for modeling use on carrots, 2) an increase in the re-application interval for use on carrots from 5 to 14 days in order to conform to label directions, and 3) an initial application date of August 9th rather than September 7th for modeling use on cotton with the Mississippi cotton scenario. Reported use patterns were not modeled for the uses assessed in the 2010 DWA; therefore, the reported use patterns listed for celery and eggplant in **Table 13** are newly assessed in this DWA update. Reported use patterns are less than the maximum use patterns for each crop except for bananas/plantains, for which reported usage was at the maximum rate.

Table 13. PRZM Input Parameters Describing "Reported" Oxamyl Use Patterns.

Uses	Scenario	Date of Initial App.	App. Rate (lbs a.i./A)	App. per Year	App. Interval (days)	CAM Input	IPSCND Input	Application Efficiency/ Spray Drift
Banana/plantain	PR coffee STD	Sep. 1	4.0	1	N/A	1	3	0.99/0.064
Carrot	PA vegetable NMC	May 24	1.0	2	14	2	1	0.99/0.064
	FL carrot STD	Oct. 30						
Celery	FL cabbage STD	Jan. 15	1.0	3	21	2	1	0.99/0.064
Cotton	TX cotton OP	Sep. 15	0.50	2	6	2	1	0.95/0.16
	STX cotton NMC	Jul. 20						
	MS cotton STD	Aug. 9						
Cucumber	STX melon NMC	Feb. 1	1.0	2	7	2	1	0.95/0.16
	FL cucumber STD	Oct. 16						
Dry bulb onion	GA onion STD	Sep. 1	0.50	7	5	2	1	0.95/0.16
Eggplant	FL pepper STD	Oct. 25	0.38	5	7	2	1	0.99/0.064
	PA tomato STD	Jul. 15						
	STX vegetable NMC	Jan. 15						

Table 13. PRZM Input Parameters Describing "Reported" Oxamyl Use Patterns.								
Uses	**Scenario**	**Date of Initial App.**	**App. Rate (lbs a.i./A)**	**App. per Year**	**App. Interval (days)**	**CAM Input**	**IPSCND Input**	**Application Efficiency/ Spray Drift**
Non-bearing fruit	FL citrus STD	Mar. 1	1.0	2	7	2	3	0.95/0.16
	PA apple STD	Apr. 16						
	Orchard BSS	Apr. 1						
Pepper	STX vegetable NMC	Oct. 1	1.0	2	7	2	1	0.95/0.16
Potato	FL potato NMC	Jan. 1	1.5	2	7	2	1	0.99/0.064
Tomato	STX vegetable NMC	Nov. 15	1.5	3	5	2	1	0.99/0.064
	FL tomato STD	Mar. 24						
	PA tomato STD	Aug. 15						

The regional PCA-adjusted 1-in-10-year peak exposure estimates in surface water drinking water sources resulting from reported usage rates for crops within the contiguous United States are listed in **Table 14** for the use-watershed region combinations that exceeded 80 µg/L for the maximum labeled use patterns (cells with highlighted values in **Table 12**). Updates with respect to these values in previous assessments include reduced values for carrots in PCA regions 8, 11, 12, and 13 and for cotton in PCA region 8 and new values for celery and eggplant in the relevant PCA regions.

The 1-in-10-year peak exposure estimate for use on bananas (204 µg/L) was unchanged from the estimate in **Table 10** because reported usage on bananas was at the maximum labeled rate.

Table 14. EDWCs (µg/L) from Reported Use Patterns by Use and by Regional PCA Specific to each Major Watershed Basin Where That Use May Occur (values >80 µg/L in bold).										
Major Basin #	**Carrot**	**Celery**	**Cotton**	**Cucumber**	**Dry bulb onion**	**Eggplant**	**Non-bearing fruit**	**Pepper**	**Potato**	**Tomato**
2	–	–	–	–	–	–	–	–	–	**86**
3	–	–	–	33	–	47	45	–	39	72
4	–	65	–	–	–	35	–	–	–	**144**
5	–	69	–	–	–	37	21	–	–	**153**
6	–	–	–	–	–	47	–	–	–	71
7	29	–	–	–	–	38	–	–	–	**159**
8	75	–	32	–	–	72	–	**87**	**88**	**125**
9	29	–	–	–	–	37	–	–	–	–
10	30	–	–	–	–	39	–	–	–	–
11	71	67	56	–	–	68	28	**82**	**83**	–
12	59	56	55	45	32	57	23	69	69	**98**
13	25	–	–	–	–	–	–	29	–	–

These results indicate that reported application patterns reduce exposure estimates for most uses below target values. At the reported application patterns modeled for uses on carrots, celery, cotton, cucumbers, dry bulb onions, eggplant, and non-bearing fruit, estimated drinking

water exposure from any major basin does not exceed 80 µg/L (celery and eggplant analyses are new). However, use on tomatoes at reported application rates results in EDWCs that exceed 80 µg/L in six watershed regions. Reported application rates for use on peppers and potatoes resulted in EDWCs that exceeded 80 µg/L by 10% or less in the Lower Mississippi and Arkansas watershed regions. Relative to the previous assessments, exposure estimates for reported application rates on carrots no longer exceed 80 µg/L.

Table 15 lists reported use patterns for the tropical crops for which Tier I exposure was estimated and provisionally characterized with Tier II models in the 2010 DWA. Reported use patterns are less than the maximum use patterns for each crop except for the pre-plant application to ginger root (at 4.0 lbs a.i./A), for which reported usage was at the maximum rate. Because FIRST cannot model different application rates throughout the season, the ginger root use pattern of 4.0 lbs a.i./A pre-planting followed by four ground or foliar applications of 0.5 lbs a.i./A every 30 days was approximated with two ground applications of 4.0 lbs a.i./A each, 60 days apart, and incorporated to a 5-cm depth. Because PE cannot model different application methods throughout the season, only the pre-plant application (at 4.0 lbs a.i./A) to ginger root was modeled (*i.e.*, post-emergent applications were not modeled as well).

Table 15. Tier I Input Parameters Describing "Reported" Oxamyl Use Patterns and Tier II PRZM Scenarios, Meteorological Files, and Input Parameters for Characterization of Tier I Modeled Use Patterns.

Use	Scenario	Metfile Location	Date of Initial App.	App. Rate (lbs a.i./A)	App. per Year	App. Interval (days)	CAM Input	IPSCND Input	Application Efficiency/ Spray Drift
Tier I Use Patterns									
Ginger root	–			4.0	1	30	Ground app. incorp. to 5 cm		
Pineapple	–			1.0	3	120	Ground app.		
Yams	–			0.5	5	14	Ground app.		
Tier II Input Parameters									
Ginger root	FL potato NMC	Hilo, HI	Dec. 15	4.0	1	None	4[A]	1	0.99/0.064
Pineapple	FL cabbage STD	Honolulu, HI	Mar. 1	1.0	3	120	2	1	0.99/0.064
Yams	FL potato NMC	San Juan, PR	Feb. 15	0.5	5	14	2	1	0.99/0.064

A Application is pre-plant at 4.0 lbs a.i./A, incorporated (CAM 4) to a 5-cm depth.

Tier I exposure estimates in surface water drinking water sources resulting from reported usage rates for the tropical crops ginger root, pineapple, and yams are listed in **Table 16**. Tier II results from provisional modeling are provided in parentheses for characterization. Exposure resulting from reported rates has not been estimated prior to this DWA update. The results indicate that reported application patterns do not reduce exposure estimates for these uses below 80 µg/L.

Table 16. EDWCs (µg/L) from Reported Use Patterns of ginger root, pineapple, and yams (values >80 µg/L in bold; provisional Tier II values are in parentheses).				
Use (modeled rate)	**PCA [A]**	**(PRZM Scenario/ Metfile)**	**1-in-10 Year Peak (µg/L)**	**1-in-10-Year Annual Mean (µg/L)**
Ginger root (4.0 lbs a.i./A/year)	100%	(FL potato NMC/ Hilo)	**198 (266)**	4.7 (6.7)
Pineapple (3.0 lbs a.i./A/year)	100%	(FL cabbage STD/ Honolulu)	**120 (149)**	2.8 (5.2)
Yams (2.5 lbs a.i./A/year)	100%	(FL potato NMC/ San Juan)	**171 (108)**	4.0 (3.9)

A The PCA for uses outside of the contiguous United States is 100%.

3. References

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